

Interactive comment on “Carbon dynamics in the Mekong Delta” by Alberto V. Borges et al.

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Reviewer comment: The Ms by Borges et al sampled waters from the three branches in the Mekong delta and examined dissolved and particulate carbon and their C isotopes for carbon geochemical processes. The Ms provides important data for C characterization and controls in the important world River Mekong. Overall, the Ms is well organized with good writing style. I have some changes for improvement of the MS.

Reply: We thank the reviewer for her/his positive evaluation of the paper.

Reviewer comment: Abstract: This part seems to be longer than the journal guideline.

Reply: In Biogeosciences, there is no size limit for the abstract. We acknowledge that our abstract is a bit long, but this reflects the descriptive nature of the paper of a rather large data-set.

C1

Reviewer comment: P2 L13: just say “tropical” is better due to that the study sites are located in the tropical climate biome.

Reply: We have kept “temperate” and “tropical”, since the majority of CO₂ and CH₄ data have been primarily reported in temperate estuaries. Also, the convergence of data in the Mekong with data in temperate estuaries is informative.

Reviewer comment: P4 L 9: updated references should be added

Reply: We have added Testa et al. (2012) (doi: 10.1002/9781118412787.ch15)

Reviewer comment: P6 L16-17 two Ganges?

Reply: Typo was corrected.

Reviewer comment: In the section of “2.1”: The annual transports of sediment and solute by Mekong are revised by Li and Bush (2015). I have noted the paper is cited by authors. Li, S.Y. y, Bush, R.T., 2015. Changing fluxes of carbon and other solutes from the Mekong River. Scientific Reports 5, 16005 DOI: 10.1038/srep16005

Reply: We have added the revised estimates of solute and solid transport given by Li and Bush (2015). Text now reads: “The annual sediment load was ~130-160 million tons in the 1960’s and 110 million tons in the 1990’s according to Milliman and Farnsworth (2011). Li and Bush (2015) report a less dramatic decrease of annual sediment load from 171 million tons for the pre-regulated period (1923-1991) to 168 million tons for the regulated period (1992-2007). Estimates of the annual solute transport ranges between 40 and 123 million tons (Meybeck and Carbonnel, 1975; Gaillardet et al., 1999; Li and Bush, 2015)”

Reviewer comment: P9 What’s the pore size?

Reply: The porosity of GF/F filters is 0.7 µm. This information was added to text.

Reviewer comment: P12 L3 Atmospheric CO₂ of 362 ppm may be not a good data

C2

Reply: Atmospheric pCO₂ (mixing ratio in dry air) was around 376 ppm in 2003-2004. Once the atmospheric CO₂ mixing ratio is converted from dry air to humidity saturated air (as required for CO₂ flux computations), the values are around 362 ppm. We have added this information to text, that now reads: "The atmospheric pCO₂ values were converted from dry air to humidity saturated air using the water vapour formulation as function of salinity and temperature given by Weiss and Price (1980). For the three sampling periods, the dry air CO₂ mixing ratio averaged 376±4 ppm and the humidity saturated air CO₂ mixing ratio averaged 362±3 ppm."

Reviewer comment: P17 L15-18, how is the figure of 0.2 and 0.9 from?

Reply: We added this information, and text now reads : "The theoretical relative change of ΔTA versus ΔDIC was derived from the stoichiometry of biogeochemical reactions, based on Brewer and Goldman (1976) for aerobic respiration, on Smith and Key (1975) for CaCO₃ dissolution, and on Froelich et al. (1979) for anaerobic reactions"

Reviewer comment: P18 L12-13 Does the positive relation between $\delta^{13}C-DIC$ and %O₂ can indicate organic matter degradation?

Reply: Yes, this relation is indeed consistent with expectations when organic matter degradation is the driving force behind the variations in both these parameters: organic matter degradation leads to O₂ consumption and a preferential release of ¹²CO₂ (since organic matter is isotopically light compared to the background DIC pool), leading to more negative delta ¹³C-DIC values

Reviewer comment: Table 1: Areal fluxes are presented as mean/median_S.D. will be better.

Reply: We have added to Table 1 the SD of the mean.

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